UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/577,979	05/01/2006	Shinichi Yamamoto	50478-2000	5180

52044 7590 01/16/2009

SNELL & WILMER L.L.P. (Panasonic)
600 ANTON BOULEVARD
SUITE 1400
COSTA MESA, CA 92626

EXAMINER	
SNYDER, ZACHARY J	
ART UNIT	PAPER NUMBER
2889	
MAIL DATE	DELIVERY MODE
01/16/2009	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/577,979	YAMAMOTO ET AL.	
	Examiner	Art Unit	
	Zachary Snyder	2889	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *18 September 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-23* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-20 and 23* is/are rejected.

7)☒ Claim(s) *21 and 22* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *01 May 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

Receipt is acknowledged of applicant's amendment filed 9/18/2008. Claims 1-23 are pending and an action on the merits is as follows.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-3 and 9-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP 2002- 117771 to Seiki et al. in view of U.S. Patent 6,642,639 B2 to Choi et al.

In regard to claim 1, Seiki discloses, in figure 1, a plasma display panel (panel 1, paragraph 5) comprising,

a front substrate (glass front board 3, paragraph 5) and a back substrate (back substrate 4, paragraph 4) that face each other with a space (discharge space 2, paragraph 5) therebetween (shown in figure 1), the front panel having a plurality of electrodes (scan electrode 7 and sustenance electrode 8, paragraph 5) disposed on a main surface thereof (shown in figure 5), and

a dielectric film (dielectric layer 5, paragraph 3) and a protective film (DLC film 13, paragraph 26 or MgO film 14, paragraph 36) formed sequentially to cover the electrodes (shown in figures 1 and 3), and luminescent display being performed by applying a voltage to the

electrodes to cause a discharge in the space (discharge space 2) between the substrates (glass front board 3 and back substrate 4), characterized in that:

a plurality of needle crystals (diamond particle 12, paragraph 21) composed of a conductive substance (carbon) are disposed to penetrate at least one of the dielectric film (dielectric layer 5) and the protective film (DLC film 13) in a thickness direction (shown in figures 1 and 3 that diamond particle 12 penetrates the DLC film 13 and MgO film 14).

Seiki does not teach that the needle crystals extend from the surface of the electrodes.

Choi discloses in figure 1, a field emission device wherein carbon nanotubes (11') are formed on the surface of the electrodes (11) for the purpose of electron emission.

At the time of the invention, it would have been obvious to one of ordinary skill in the art, having the teachings of Seiki and Choi before him or her, to modify the emission device of Seiki to comprise needle crystal placement as taught by Choi since forming electron emission sources (diamond particle 12 of Seiki and nanotube 11' of Choi) that extend from the surface of the electrode is known in the art as demonstrated by Choi.

In regard to claim 2, Seiki in view of Choi teaches all the limitations of claim 1. Seiki also discloses that the needle crystals (diamond particle 12) are disposed substantially perpendicular to the main surface of the front substrate (glass front board 3) to penetrate the protective film in a thickness direction (shown in figure 3 to be penetrating MgO film 14), and a material of the protective film is layered to completely fill gaps between the needle crystals (shown in figure 3).

In regard to claim 3, Seiki in view of Choi teaches all the limitations of claim 2. Seiki also discloses that the protective film material (MgO film 14) and the needle crystals (diamond particle 12) form a phase-separated structure (shown in figure 3 that the MgO film 14 fills in the gaps between diamond particle 12 forming a phase separation between individual particles).

In regard to claim 9, Seiki in view of Choi teaches all the limitations of claim 2 and that the tips of the needle crystals (diamond particle 12) are exposed above the surface (shown in figure 3) of the protective film (DLC film 13).

In regard to claim 10, Seiki in view of Choi teaches all the limitations of claim 2 and that the tips of the needle crystals (diamond particle 12) are buried (shown in figure 1) in the protective film (DLC film 13).

In regard to claim 23, Seiki in view of Choi teaches all the limitations of claim 1. Seiki also discloses that the protective film is composed of magnesium oxide (MgO film 14, paragraph 36).

Claims 1, 11-13, 15, 18, 20, and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over WO 2004/086449 to Kim et al. in view of U.S. Patent 6,642,639 B2 to Choi et al.

In regard to claim 1, Kim discloses, in figure 2, a plasma display panel (page 8, line 22)) comprising,

a front substrate (front panel 100, page 8, line 22) and a back substrate (inherently present) that face each other with a space (inherently present) therebetween, the front panel having a plurality of electrodes (electrodes 300 and 302, page 9, line 5) disposed on a main surface thereof, and

a dielectric film (dielectric layers 400 and 410, page 8, lines 25 and 27) and a protective film (protective film 500, page 8, line 28) formed sequentially to cover the electrodes, and luminescent display being performed by applying a voltage to the electrodes to cause a discharge in the space between the substrates (inherent function of the PDP), characterized in that:

a plurality of needle crystals (nano tips 610, page 8, line 7) composed of a conductive substance (carbon, page 5, lines 18-21) are disposed to penetrate at least one of the dielectric film (dielectric layer 410) and the protective film (protective film 500) in a thickness direction.

Kim does not teach that the needle crystals extend from the surface of the electrodes.

Choi discloses in figure 1, a field emission device wherein carbon nanotubes (11') are formed on the surface of the electrodes (11) for the purpose of electron emission.

At the time of the invention, it would have been obvious to one of ordinary skill in the art, having the teachings of Kim and Choi before him or her, to modify the emission device of Seiki to comprise needle crystal placement as taught by Choi since forming electron emission sources (diamond particle 12 of Seiki and nanotube 11' of Choi) that extend from the surface of the electrode is known in the art as demonstrated by Choi.

In regard to claim 11, Kim in view Choi teaches all the limitations of claim 1 and that the needle crystals (nano tips 610) are disposed substantially perpendicular (shown in figure 2) to the

main surface of the front substrate to penetrate the dielectric film (dielectric layer 410) in a thickness direction, and a material of the dielectric film (dielectric layer 410) and a material of the protective film (protective film 500) are layered to completely fill gaps between the needle crystals (shown in figure 2).

In regard to claim 12, Kim in view Choi teaches all the limitations of claim 11 and that the dielectric film material (dielectric layer 410) and the needle crystals (nano tips 610) form a phase-separated structure (shown in figure 2 that the dielectric layer 410 fills in the gaps between nano tips 610 forming a phase separation between individual nano tips).

In regard to claim 13, Kim in view Choi teaches all the limitations of claim 11 and that the needle crystals (nano tips 610) are graphite crystals (nano tips formed of a carbon compound such as carbon nano tubes, page 5, lines 18-19).

In regard to claim 15, Kim in view Choi teaches all the limitations of claim 13 and that the graphite crystals (nano tips 610) are one member selected from the group consisting of carbon nanotubes, graphite nanofibers, and diamond-like carbon (nano tips formed of a carbon compound such as carbon nano tubes, page 5, lines 18-19).

In regard to claim 18, Kim in view Choi teaches all the limitations of claim 11 and that the tips of the needle crystals (nano tips 610) are exposed above the surface (shown in figure 2) of the protective film (protective film 500).

In regard to claim 20, Kim in view Choi teaches all the limitations of claim 11 and that the electrodes include a display electrode pair (electrode 300 and 302), and the needle crystals (nano tips 610) are disposed on one or both of the display electrodes in the pair (shown in figure 2 to be disposed on both).

In regard to claim 23, Kim in view Choi teaches all the limitations of claim 1 and that the protective film (protective film 500) is composed of one or a compound of metal oxides selected from the group consisting of magnesium oxide, calcium oxide, strontium oxide, and barium oxide (protective film 500 is composed of MgO, page 8, line 28).

Claims 4 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP 2002-117771 to Seiki et al. in view of U.S. Patent 6,642,639 B2 to Choi et al. as applied to claims 1-3 and 9-10 above, and further in view of WO 2004/086449 to Kim et al.

In regard to claims 4 and 6, Seiki in view of Choi teach all the limitations of claim 2 but does not disclose that the needle crystals are graphite crystals are made of one member selected from the group consisting of carbon nanotubes, graphite nanofibers, and diamond-like carbon.

Kim discloses a PDP device employing needle crystals (nano tips 610, page 8, line 7) that graphite crystals are made of one member selected from the group consisting of carbon nanotubes, graphite nanofibers, and diamond-like carbon (nano tips formed of a carbon compound such as carbon nano tubes, page 5, lines 18-19).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to make the needle crystals of the PDP from graphite crystals that are made of one member selected from the group consisting of carbon nanotubes, graphite nanofibers, and diamond-like carbon as taught by Kim because Kim teaches in the technical field paragraph that forming the specific nano tips on the dielectric layer will improve light emitting efficiency and drop the driving voltage. Kim teaches that these specific nano tips, implying their location in the display as well as the material they comprise, will work towards improving the light emitting efficiency and drop the driving voltage.

Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over over JP 2002-117771 to Seiki et al. in view of U.S. Patent 6,642,639 B2 to Choi et al. in further view of WO 2004/086449 to Kim et al. as applied to claim 4 above, and further in view of US Patent 5,872,422 to Xu et al.

In regard to claim 5, Seiki in view of Choi in view of Kim teaches all the limitations of claim 4 but does not teach that a metal layer composed of one or a plurality of metals selected from the group consisting of iron, cobalt, and nickel is interposed between the dielectric film and the needle crystals.

Xu teaches a carbon fiber emission device wherein a metal layer composed from the group consisting of iron, cobalt, and nickel (metal catalyst film 134, COL. 17, L1NE 18-19, is containing iron, cobalt, nickel, etc. is used as the transition metal for the catalyst, COL. 19,

L1NES 36-39) is interposed between the needle crystals (carbon emitters 142, COL. 17, L1NES 23-24) and the dielectric film (resistor layer 132 that limits the emission current).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to include a metal layer composed of iron, cobalt, or nickel as taught by Xu in between the needle crystals (nanotip made of carbon nanotube) and the dielectric layer taught by Seiki in view of Choi in view of Kim since transition metals, such as iron, cobalt, and nickel, are suitable catalyst material for a catalyst layer for growing carbon nanotubes, as taught by Xu et al.

Claims 7 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP 2002-117771 to Seiki et al. in view of U.S. Patent 6,642,639 B2 to Choi et al. as applied to claims 1-3 and 9-10 above, and further in view ofU.S. PG Publication 2002/0060514 A1 to Nakamoto and EP 0325797 A1 to Yoshinaka et al.

In regard to claims 7 and 8, Seiki in view of Choi a PDP employing needle crystals but does not teach that the needle crystals are tetrapod-shaped particles composed of zinc oxide.

Nakamoto discloses an electron emission device employing needle crystals (micro bodies 44, paragraph 52) that are tetrapod-shaped particles and composed of zinc oxide (micro bodies 44 are tetrapod-shaped and made of Zno, paragraph 52).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to have the needle crystals taught by Seiki in view of Choi be composed of zinc oxide and have a tetrapod shape as taught by Nakamoto because Yoshinaka discloses that the zinc

oxide whiskers with a tetrapod shape exhibit significantly improved electrical properties without showing any anisotropy with respect to the characteristic properties (page 3, lines 3-5).

Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over WO 2004/086449 to Kim et al. in view of U.S. Patent 6,642,639 B2 to Choi et al. as applied to claims 1, 11-13, 15, 18, 20, and 23 above, and further in view of US Patent 5,872,422 to Xu et al.

In regard to claim 14, Kim in view of Choi teaches all the limitations of claim 13 but does not teach that a metal layer composed of one or a plurality of metals selected from the group consisting of iron, cobalt, and nickel is interposed between the dielectric film and the needle crystals.

Xu discloses a carbon fiber emission device wherein a metal layer composed from the group consisting of iron, cobalt, and nickel (metal catalyst film 134, COL. 17, L1NE 18-19, is containing iron, cobalt, nickel, etc. is used as the transition metal for the catalyst, COL. 19, L1NES 36-39) is interposed between the needle crystals (carbon emitters 142, COL. 17, L1NES 23-24) and the dielectric film (resistor layer 132 that limits the emission current):

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to include a metal layer composed of iron, cobalt, or nickel as taught by Xu in between the needle crystals (nanotip made of carbon nanotube) and the dielectric layer taught by Kim in view of Choi since transition metals, such as iron, cobalt, and nickel, are suitable catalyst material for a catalyst layer for growing carbon nanotubes, as taught by Xu et al.

Claims 16 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over WO 2004/086449 to Kim et al. in view of U.S. Patent 6,642,639 B2 to Choi et al. as applied to claims 1, 11-13, 15, 18, 20, and 23 above, and further in view of U.S. PG Publication 2002/0060514 A1 to Nakamoto and EP 0325797 A1 to Yoshinaka et al.

In regard to claims 16 and 17, Kim in view of Choi teaches a PDP employing needle crystals but does not teach that the needle crystals are tetrapod-shaped particles composed of zinc oxide.

Nakamoto discloses an electron emission device employing needle crystals (micro bodies 44, paragraph 52) that are tetrapod-shaped particles and composed of zinc oxide (micro bodies 44 are tetrapod-shaped and made of Zno, paragraph 52).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to have the needle crystals taught by Kim in view of Choi to be composed of zinc oxide and have a tetrapod shape as taught by Nakamoto because Yoshinaka teaches that the zinc oxide whiskers with a tetrapod shape exhibit significantly improved electrical properties without showing any anisotropy with respect to the characteristic properties (page 3, lines 3-5).

Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over WO 2004/086449 to Kim et al. in view of U.S. Patent 6,642,639 B2 to Choi et al. as applied to claims 1, 11-13, 15, 18, 20, and 23 above, and further in view of JP 2002-117771 to Seiki et al.

In regard to claim 19, Kim in view of Choi teaches all the limitations of claim 11 but does not teach that the tips of the needle crystals are buried in the protective film.

Seiki discloses a PDP device employing needle crystals (diamond particle 12) that are buried (shown in figure 1) in the protective film (DLC film 13).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to bury the needle crystals in the protective layer as taught by Seiki because Seiki discloses that covering the diamond particle 12 with the DLC film 13 will reduce sustaining voltage (paragraph 26).

Allowable Subject Matter

Claims 21 and 22 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claim 21 is allowable because the examiner is unable to find prior art in which needle crystals are formed on an electron emitting electrode formed between the display electrode pair and penetrates the dielectric layer in a thickness direction and the material of the dielectric layer and protection layer are layered to completely fill gaps between the needle crystals.

Art such as US Patent 5,973,444 to Xu et al. show need crystals formed between an electrode pair but there is no dielectric layer being penetrated by the needle crystals and no protection layer completely filling in the gaps between the needle crystals.

Claim 22 is allowable because it depends from claim 21.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Zachary Snyder whose telephone number is (571)270-5291. The examiner can normally be reached on Monday through Thursday, 7:30AM to 6PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Toan Ton can be reached on (571)272-2303. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Karabi Guharay/
Primary Examiner, Art Unit 2889

/Zachary Snyder/
Examiner, Art Unit 2889